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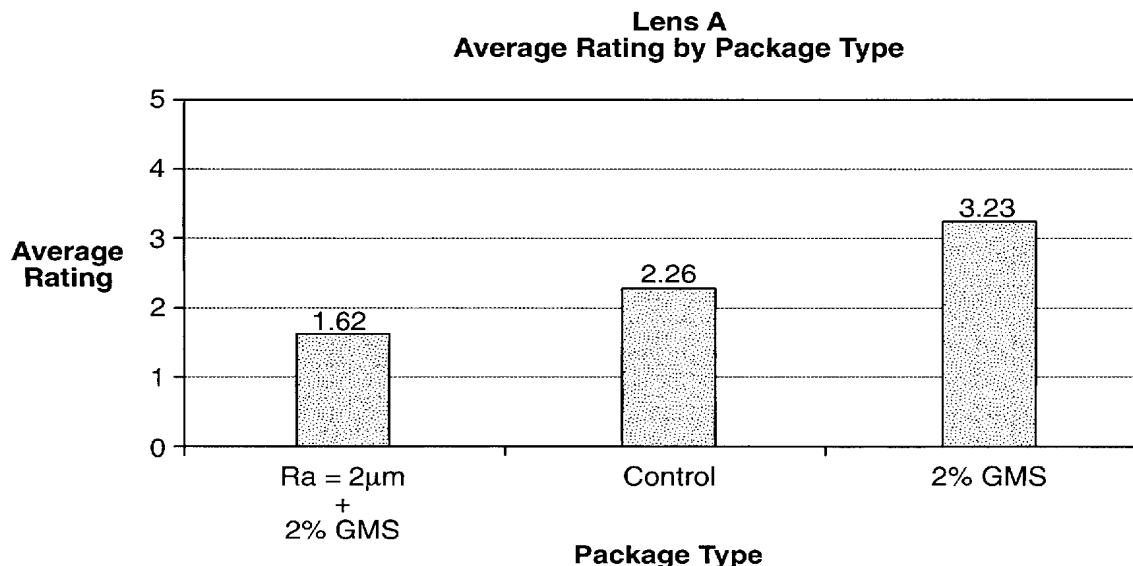
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(54) Title: CONTACT LENS PACKAGES CONTAINING ADDITIVES



(57) Abstract: A package having an additive that does not adhere to a medical device enclosed therein.

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## CONTACT LENS PACKAGES CONTAINING ADDITIVES RELATED APPLICATIONS

This application is a non-provisional filing of a provisional application,  
U.S. Pat. App. No.60/436,109, filed on December 23, 2002.

### 5 FIELD OF THE INVENTION

This invention related to packages for storing contact lenses as well as  
methods of using and preparing these packages.

### BACKGROUND

Contact lenses have been used commercially to improve vision since the  
10 1950s. At first contact lenses were made of hard materials, which were  
relatively easy to handle and package for use, but were uncomfortable for  
many patients. Later developments, gave rise to softer more comfortable  
lenses made of hydrophobic hydrogels, particularly silicone hydrogels. These  
lenses are very pliable, but due to this texture and their chemical composition,  
15 they present a number of problems with packaging.

Most contact lenses are packaged in individual blister packages having  
a bowl portion and a foil top, where the bowl portion is made from a  
hydrophobic material such as polypropylene. See U.S. Patent Nos. 4,691,820;  
5,054,610; 5,337,888; 5,375,698; 5,409,104; 5,467,868; 5,515,964; 5,609,246;  
20 5,695,049; 5,697,495; 5,704,468; 5,711,416; 5,722,536; 5,573,108; 5,823,327;  
5,704,468; 5,983,608; 6,029,808; 6,044,966; and 6,401,915 for examples of  
such packaging, all of which are hereby incorporated by reference in their  
entirety. While polypropylene is resilient enough to withstand the sterilization  
steps of contact lens manufacture, this material has an affinity for contact  
25 lenses made of silicone hydrogels. When silicone hydrogels are packaged in  
polypropylene bowls, the lenses stick to the bowl and cannot be removed from  
the package without damaging the pliable lenses. Therefore is a need to  
prepare a contact lens package that has resilient properties, but does not stick  
to the final product. It is this need that is met by the following invention.

### 30 BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates the data for Lens A in different packages

Figure 2 illustrates the data for Lens B in different packages

Figure 3 illustrates the data for Lens C in different packages

## DETAILED DESCRIPTION OF THE INVENTION

This invention includes a package for storing medical devices in a solution comprising, consisting essentially of, or consisting of, a molded base wherein the molded base comprises an additive, provided that  
5 the medical device is not a contact lens consisting of acqualfilcon A coated with polyHema.

As used herein a "medical device" is any device that is stored or packaged in a solution and is used to treat a human disease. Examples of medical devices include but are not limited to ophthalmic devices that reside in  
10 or on the eye. Ophthalmic devices includes but are not limited to soft contact lenses, intraocular lenses, overlay lenses, ocular inserts, and optical inserts. These devices can provide optical correction or may be cosmetic. The preferred medical devices of the invention are soft contact lenses made from silicone elastomers or hydrogels, which include but are not limited to silicone  
15 hydrogels, and fluorohydrogels. Soft contact lens formulations are disclosed in U.S. Pat. App. No. 60/318,536, entitled Biomedical Devices Containing Internal wetting Agents," filed on September 10, 2001 and its non-provisional counterpart of the same title, filed on September 6, 2002, US Patent No. 5,710,302, WO 9421698, EP 406161, JP 2000016905, U.S. Pat. No.  
20 5,998,498, US Pat. App. No. 09/532,943, U.S. Patent No. 6,087,415, U.S. Pat. No. 5,760,100, U.S. Pat. No. 5,776, 999, U.S. Pat. No. 5,789,461, U.S. Pat. No. 5,849,811, and U.S. Pat. No. 5,965,631. The foregoing references are hereby incorporated by reference in their entirety. The particularly preferred medical devices of the invention are soft contact lenses made from etafilcon A,  
25 genfilcon A, lenefilcon A, polymacon, balafilcon A, lotrafilcon A. and silicone hydrogels as prepared in U.S. Pat. No. 5,998,498, U.S. Pat. App. No. 09/532,943, a continuation-in-part of US Pat App. No. 09/532,943, filed on August 30, 2000, U.S. Patent No. 6,087,415, U.S. Pat. No. 5,760,100, U.S. Pat. No. 5,776, 999, U.S. Pat. No. 5,789,461, U.S. Pat. No. 5,849,811, and U.S. Pat.  
30 No. 5,965,631. These patents as well as all other patent disclosed in this application are hereby incorporated by reference in their entirety. The more particularly preferred medical devices of the invention are soft contact lenses, balafilcon A, lotrafilcon A, galyfilcon A, senofilcon A, or those made as

described in U.S. Pat. App. No. 60/318,536, entitled Biomedical Devices Containing Internal wetting Agents," filed on September 10, 2001 and its non-provisional counterpart of the same title, filed on September 6, 2002. The most particularly preferred medical devices are soft contact lenses made from either

5 galyfilcon A or senofilcon A.

The term "molded base" refers to any polymer, rubber, or plastic that can be formed into a receptacle for medical devices, where the size and shape of the base are determined by the device and other considerations known those who are skilled in the art of making or designing molded bases. For example

10 molded bases may be individual blister packages, secondary packages, or hydrating trays. The molded base may be prepared from any number of materials provided that those materials are compatible with the chemical and physical properties of the device. Examples of suitable materials include but are not limited to polypropylene, polyethylene, nylons, olefin co-polymers,

15 acrylics, rubbers, urethanes, polycarbonates, or fluorocarbons. The preferred materials are metallocenes polymers and co-polymers made of polypropylene, polyethylene, having a melt flow range of about 15 g/10 minutes to about 44 g/10 minutes as determined by ASTM D-1238. With respect to the shape of the molded base, examples of suitably shaped bases are disclosed in the

20 following patents which are hereby incorporated by reference in their entirety, U.S. Patent Nos. D 458,023; 4,691,820; 5,054,610; 5,337,888; 5,375,698; 5,409,104; 5,467,868; 5,515,964; 5,609,246; 5,695,049; 5,697,495; 5,704,468; 5,711,416; 5,722,536; 5,573,108; 5,823,327; 5,704,468; 5,983,608; 6,029,808; 6,044,966; and 6,401,915. As in the cited references, the molded based is

25 sealed about the cavity that encloses the contact lens. Flexible cover sheets can be made from can be an adhesive laminate of an aluminum foil and a polypropylene film or any other extruded or co-extruded film that can be sealed to the top surface of the flange in order to form a hermetic seal for the medical device and the solution. Further, the base can be formed by any of a number

30 of known methods which include but are not limited to injection molding, transfer molding, skin packaging, blow molding, coinjection molding, film extrusion, or film coextrusion.

As used herein the term "additive" refers to a substance that is added to the polymer, rubber, or plastic prior to forming the molded base, where the material inhibits sticking, adherence, or adhesion of the medical device to the molded base. The additive is mixed with the remainder of the molded base material and amount of additive present by weight percentage based on the total weight of the molded base material is greater than about 0.25 to about 10 weight percent, preferably greater than about 0.25 to about 5 weight percent, most preferably about 0.25 to about 3 weight percent. The preferred additives are glycerol monostearate (2%), polyvinylpyrrolidone (1% to 5%), polyvinylpyrrolidone/maleic anhydride (1/1% to 5/5%), and succinic acid (5%). Polyvinylpyrrolidinone has a variety of molecular weight ranges (as indicated by the KD#) and consistencies (flake, powdered/micronized). When PVP KD90 is used as an additive, it is preferred that it is powdered/micronized.

The term "solution" refers to any liquid medium in which a medical device is stored. The preferred solutions are aqueous solutions contain physiological buffers. The particularly preferred solution is saline solution.

For example, if the medical device is a contact lens, it is preferred that the molded base is transparent to the degree necessary to permit visual inspection, UV sterilization or both. The preferred additives are glycerol monostearate present at about 2 weight percent, succinic acid present at about 5 weight percent, PVP KD90 present at about 1-5 weight percent, PVP/maleic anhydride present at about 1/1 to about 5/5 weight percent. If the inner surface of the medical device has a roughness of about 0.2  $\mu\text{m}$  to about 4.5  $\mu\text{m}$ , the preferred additives are maleic anhydride or PVP/maleic anhydride, most preferably maleic anhydride.

Further, the invention includes a method of reducing the adherence of a medical device to its packaging, comprising, consisting essentially of, or consisting of, storing said medical device in a solution in a package comprising, consisting essentially of, or consisting of, a molded base wherein said molded base comprises an additive, provided that the medical device is not a contact lens consisting of acqualfilcon A coated with polyHema. The terms molded base, medical device, solution and additive all have their aforementioned meanings and preferred ranges.

When soft contact lenses are prepared, the lenses cured to a hard disc and subsequently hydrated with water to give the non-sterilized final product. During this hydration step, soft contact lenses often stick to the surface of the hydration chamber and it would be useful to find a method of hydrating soft contact lenses which alleviates this problem.

To solve this problem, the invention includes a method of hydrating a contact lens comprising, consisting essentially of, or consisting of hydrating said lens in a molded base wherein said molded base comprises an additive. The terms molded base, medical device, solution and additive all have their  
10 aforementioned meanings. The preferred values for the medical device, the solution and the additive are as listed above. The preferred molded base is a square or a rectangle.

Others have tried to address the problem of a medical device adhering to its packaging. For example U.S. Pat. App. No. 09/942,347, entitled "Textured  
15 Contact Lens Package," filed on August 29, 2001 and U.S. Pat. App. No. 10/183,133, entitled "Contact Lens Packages," filed on June 26, 2002 disclose solutions to this problem. The disclosure of these applications are hereby incorporated by reference in their entirety. Even though those methods address this problem, it is contemplated by the inventors of this patent  
20 application that the additives of this invention may be incorporated into the packaging of each of the cited references.

In order to illustrate the invention the following examples are included. These examples do not limit the invention. They are meant only to suggest a method of practicing the invention. Those knowledgeable in contact lenses as  
25 well as other specialties may find other methods of practicing the invention. However, those methods are deemed to be within the scope of this invention.

#### EXAMPLES

The following abbreviations are used below

Ampacet 40604	fatty acid amide
30 ATOFINA 3924CWZ	Finacene Nucleated polypropylene having a melt flow of 55g/10 minutes, ASTM D1238. This material contains an antistat and a lubricant
Atmer 163	fatty alkyl diethanolamine Reg. No. 107043-84-5

	Dow Siloxane MB50-321	a silicone dispersion
	Epolene E43-Wax,	maleic anhydride produced by Eastman Chemical
	Erucamide	fatty acid amide Registry No. 112-84-5
5	Exxon 1605	Exxon Achieve, PP1605, a metallocene polypropylene having a melt flow of 32 g/10 minutes, ASTM D-1238 (L)
	Exxon 1654	Exxon Achieve, PP1654, a metallocene isotactic polypropylene having a melt flow of 16 g/10 minutes, ASTM D-1238 (L)
10	Fina EOD-001	Finacene, a metallocene and isotactic polypropylene having a melt flow of 16g/10 minutes, ASTM D1238
	Flura	Registry No.7681-49-4
	Kemamide	fatty acid amide
15	Licowax	fatty acid amide
	Mica	Registry No. 12001-26-2
	Nurcrel 535 & 932	ethylene-methacrylic acid co-polymer resin Registry No. 25053-53-6
	Oleamide	fatty acid amide Registry No. 301-02-0
20	polyHema	poly hydroxy ethylmethacrylate having a molecular weight of greater than 1MM Dalton
	mPDMS	800-1000 MW monomethacryloxypropyl terminated polydimethylsiloxane
	Pluronic	polyoxypropylene-polyoxyethylene block co-polymer
25	PVP	Registry No.106392-12-5 poly vinyl pyrrolidinone, wherein KD# refers to different known molecular weight distributions of poly vinyl pyrrolidinone
30	Simma 2	3-methacryloxy-2-hydroxypropyloxy)propylbis (trimethylsiloxy)methylsilane
	Super-Floss anti block	slip/anti blocking agent, Registry No. 61790-53-2
	Tetronic	alkyoxylated amine 110617-70-4
	Zeospheres anti-block	slip/anti blocking agent

**Lens Preparations**

- 5      **Lens A**      Acquafilcon A lenses coated with polyhema having a molecular weight of about 1,000,000. See U.S. Pat App. No. 09/957,299, entitled "Soft Contact Lenses," filed on September 20, 2001, Example 27. The coating method is disclosed in U.S. Pat. App. No. 09/921,192, entitled "Method for Correcting Articles by Mold Transfer," filed on August 2, 2001.
- 10      **Lens B**      Contact lenses prepared as described in U.S. Pat. App. No. 60/318,536, entitled Biomedical Devices Containing Internal wetting Agents," filed on September 10, 2001 and its non-provisional counterpart of the same title, filed on September 6, 2002, containing by weight percent 30% Simma 2, 19% mPDMS, 31% DMA, 6% PVP (MW 360,000), 0.8%EDGMA, 0.23% CGI81, 1.5% Norbloc, 11% PVP (MW 2,500), 0.02% Blue Hema, 0-2 ac PDMS, 29% t-amyl alcohol.
- 15
- 20      **Lens C**      Contact lenses prepared as described in U.S. Pat. App. No. 60/318,536, entitled Biomedical Devices Containing Internal wetting Agents," filed on September 10, 2001 and its non-provisional counterpart of the same title, filed on September 6, 2002, containing by weight percent 28% Simma 2, 31% mPDMS, 23.5% DMA, 7% PVP (MW 360,000), 1.5%TEDGMA, 0.98% CGI 1850, 2.0% Norbloc, 6 HEMA, 0.02% Blue Hema.
- 25

**Example 1****30      Preparation of Packages with Different Additives**

Additives (identity and amounts listed in Table 1) were mixed with polypropylene (listed below). The material was injection molded to form the base portion of a contact lens package. The configuration of the package is as



illustrated in Figure1 of U.S. Pat No. 5,467,868 which is hereby incorporated by reference.

Contact lenses made from aquafilcon A coated with polyhema, a silicone hydrogel, were added to individual polypropylene blister packs having different additives containing 950 $\mu$ L of saline solution and then the blister pack was heat sealed with an flexible cover. Lenses were visually evaluated for adhesion to the package after sterilization. The flexible cover sheet was removed and the molded base is rotated or jiggled without spilling the saline solution while a contact lens is observed to determine if it is adhered to the inner surface of the molded base. Lenses that do not adhere are free floating and pass the test. If the lenses adhere to the molded base in any manner they fail the test. The additive, its weight percentage, the number of lenses that stuck to the package, and number of lenses that were free floating are displayed in Table 1. This example illustrates that glycerol monostearate is a superior additive.

TABLE 1

	<u>Polypropylene</u>	<u>Additive</u>	<u># tested</u>	<u># stuck</u>
	Exxon 1605	none	12	12
20	Exxon 1605	calcium stearate	36	36
	Exxon 1605	2% glycerol monostearate	36	3
	Exxon 1654	2% glycerol monostearate	84	2
	Exxon 1654	none	12	12
	Exxon Exxelor P1020	none	12	12
25	Fina EOD-0011	none	12	12
	Fina EOD-0011	1% zinc stearate	12	12
	Fina EOD-0011	3% zinc stearate	12	12
	FINA 3924CW@	antistat	36	36

30

## Example 2

Consumer Test

Packages containing 2% weight percent GMS and Exxon 1605 were prepared using the method of Example 1. Contact lenses of types A, B, and C

were added to individual blister packages along with 950  $\mu$ L of saline solution. The filed packages were heat sealed with flexible covers and sterilized. The packaged lenses were submitted to consumers. The consumers opened the packages and evaluated the lenses for ease of removal of the lens from the package using the following criteria and grading system

- 1-very easy removal-Lens comes out without any problems
- 2-easy removal-a couple of attempts to remove the lenses, but overall there were no real problems in removal
- 3-moderate removal- several tries before lens comes out, neither pleased or displeased
- 4-difficult removal-many tries to remove with finger or nail-removal is frustrating
- 5-very difficult removal-many tries to remove with a finger or nail, lens damage upon removal- very unacceptable

Figure 1 illustrates the testing results for a comparison of Lens A in a polypropylene package (control), Lens A in a package containing 2.0% GMS where the package has an average surface roughness (Ra) of about 2.0  $\mu$ m, and Len A in a package containing 2.0% GMS. This figure shows that the roughened package containing GMS has the highest consumer rating.

Figure 2 illustrates the testing results for a comparison of Lens B in a polypropylene package (control), Lens B in a package containing 2.0% GMS where the package has an average surface roughness (Ra) of about 2.0  $\mu$ m, and Len B in a package containing 2.0% GMS. This figure shows that the package containing 2.0 %GMS has the highest consumer rating.

Figure 3 illustrates the testing results for a comparison of Lens C in a polypropylene package (control), Lens C in a package containing 2.0% GMS where the package has an average surface roughness (Ra) of about 2.0  $\mu$ m, and Len C in a package containing 2.% GMS. This figure shows that the package containing 2.0 %GMS has the highest consumer rating.

### Example 3

#### Preparation of Packages With Different Additives

The testing methods and preparations of Example 1 were repeated with different additives and lens types as per Table 2. If "(UP)" appears in an entry, that bowl of the blister is shaped as in U.S. Pat. No. D 458,023. When the term "Rough Bowl" appears, the inside surface of the bowl is roughened to an Ra of

5 0.5mm to 0.8mm.

Table 2					
	Base Resin	Lens Type	Tested	Stuck	Additive
10	Exxon 1605 PP	Lens B	15	13	Calcium stearate (2%)
	Exxon 1605 PP	Lens B	120	0	GMS (2%)
	Exxon 1605 PP	Lens C	30	0	GMS (2%)
	Exxon 1605 PP	Lens B	15	12	Dow Siloxane MB50-321 (10%)
	Exxon 1605 PP	Lens B	15	13	Dow Siloxane MB50-321 (5%)
15	Exxon 1605 PP	Lens B	57	50	Ampacet 40604 99.5/1.5 Erucamide
	Ampacet 40604 PP	Lens B	15	15	Erucamide (5%)
	Exxon 1605 PP	Lens B	15	15	Kemamide (Erucamide) (5%)
	Exxon 1605 PP	Lens B	15	12	Superfloss anti-bock (2%)
	Exxon 1605 PP	Lens B	15	15	Zeospheres anti-block (2%)
20	Exxon 1605 PP	Lens B	15	14	Superfloss anti-bock (2%) Oleamide (.2%)
	Exxon 1605 PP	Lens B	14	13	Superfloss anti-bock (.2%) Oleamide (.2%)
	Exxon 1605 PP	Lens B	15	15	Talc (5%)
	Exxon 1605 PP	Lens B	15	13	Calcium carbonate (5%)
	Exxon 1605 PP	Lens B	15	14	Zinc stearate (5% hand blend)
25	Exxon 1605 PP	Lens B	15	15	Zinc stearate (5% machine blend)
	Exxon 1605 PP	Lens B	15	14	ATP (Vitamin E) (5%)
	Exxon 1605 PP	Lens B	15	13	Licowax (1%)
	Exxon 1605 PP	Lens B	15	14	Polyethyleneglycol monolaurate (5%)
	Exxon 1605 PP	Lens B	15	15	Mica (5%)
30	Exxon 1605 PP	Lens B	175	8	Succinic Acid (5%)
	Exxon 1605 PP	Lens B	15	13	Succinic Anhydride (5%)
	Exxon 1605 PP	Lens B	118	22	Epolene E-43 (20% machine blend)
	Exxon 1605 PP	Lens B	100	92	Epolene E-43 (20% machine blend)
	Exxon 1605 PP	Lens B	127	52	Epolene E-43 (10% hand blend)
35	Exxon 1605 PP	Lens B	130	16	Epolene E-43 (10% machine blend)
	Exxon 1605 PP	Lens C	15	6	Epolene E-43 (10% machine blend)
	Exxon 1605 PP	Lens B	30	22	Epolene E-43 (5% machine blend)
	Exxon 1605 PP	Lens C	15	3	Epolene E-43 (5% machine blend)
	Exxon 1605 PP	Lens B	15	15	Atmer 163 (1%)
40	Exxon 1605 PP	Lens B	15	10	MC (5%)
	Exxon 1605 PP	Lens B	30	2	Boric Acid (5% hand blend)
	Exxon 1605 PP	Lens B	215	3	Boric Acid (5% machine blend)
	Exxon 1605 PP	Lens C	15	0	Boric Acid (5% machine blend)
	Exxon 1605 PP	Lens B	15	13	Boric Acid (3% hand blend)
45	Exxon 1605 PP	Lens B	15	15	Boric Acid (2% hand blend)
	Exxon 1605 PP	Lens B	150	4	Epolene E-43 (10% machine blend)
	Exxon 1605 PP	Lens B	50	9	Epolene E-43 (10% machine blend)
	Exxon 1605 PP	Lens B	50	15	Epolene E-43 (10% machine blend)
	Exxon 1605 PP	Lens B	50	35	Epolene E-43 (10% machine blend)
50	Exxon 1605 PP	Lens B	255	6	PVP K90 (5.0%)
	Exxon 1605 PP	Lens B	98	31	PVP K90 (2.5%)
	Exxon 1605 PP	Lens B	98	49	PVP K90 (1.25%)
	Exxon 1605 PP	Lens B	20	6	PVP K90 (1.0%)
	Exxon 1605 PP	Lens B	20	10	PVP K90 (.75%)

	Exxon 1605 PP	Lens B	20	17	PVP K90 (.5%)
	Exxon 1605 PP	Lens C	248	5	PVP K90 (5.0%)
	Exxon 1605 PP	Lens C	39	0	PVP K90 (10%) Blended down to 5%
5	Exxon 1605 PP	Lens C	135	42	PVP K90 (2.5%)
	Exxon 1605 PP	Lens C	135	54	PVP K90 (1.25%)
	Exxon 1605 PP	Lens C	70	42	PVP K90 (1.0%)
	Exxon 1605 PP	Lens C	70	50	PVP K90 (.75%)
	Exxon 1605 PP	Lens C	70	60	PVP K90 (.5%)
10	Exxon 1605 PP	Lens B	15	14	Nucrel 535 - 10.5% acid comonomer (2%)
	Exxon 1605 PP (3%)	Lens B	15	15	Nucrel 925 - 15% acid comonomer
15	Exxon 1605 PP (2%)	Lens C	15	14	Nucrel 535 - 10.5% acid comonomer
	Exxon 1605 PP (3%)	Lens C	15	14	Nucrel 925 - 15% acid comonomer
	Exxon 1605 PP	Lens B	15	15	2% XNAP with Pluronic
20	Exxon 1605 PP	Lens C	15	14	2% XNAP with Pluronic
	Exxon 1605 PP	Lens B	15	15	Pluronic 1%
	Exxon 1605 PP	Lens C	15	15	Pluronic 1%
	Exxon 1605 PP	Lens B	15	11	1% Tetronic
	Exxon 1605 PP	Lens C	15	15	1% Tetronic
25	Exxon 1605 PP	Lens B	15	15	1% Flura
	Exxon 1605 PP	Lens C	15	15	1% Flura
	Exxon 1605 PP	Lens B	30	23	2% Pluronic
	Exxon 1605 PP	Lens C	30	16	2% Pluronic
	Exxon 1605 PP	Lens C	77	0	PVP K90 (5%) + Epolene E43 (5%)
30	Exxon 1605 PP	Lens B	50	0	PVP K90 (5%) + Epolene E43 (5%)
	Exxon 1605 PP	Lens C	62	0	PVP K90 (5%) + Epolene E43 (1.5%)
	Exxon 1605 PP	Lens B	50	0	PVP K90 (5%) + Epolene E43 (1.5%)
35	Exxon 1605 PP	Lens C	65	0	PVP K90 (2.5%) + Epolene E43 (1.25%)
	Exxon 1605 PP	Lens B	50	0	PVP K90 (2.5%) + Epolene E43 (1.25%)
	Exxon 1605 PP	Lens C	115	10	PVP K90 (1%) + Epolene E43 (1%)
40	Exxon 1605 PP	Lens B	100	11	PVP K90 (1%) + Epolene E43 (1%)
	Exxon 1605 PP	Lens C	30	0	PVP K29/31 (5%)
	Exxon 1605 PP	Lens C	30	0	PVP K60 (5%)
	Exxon 1605 PP	Lens B	50	0	PVP K90 (1%) + Rough Bowl (UP)
	Exxon 1605 PP	Lens C	50	0	PVP K90 (1%) + Rough Bowl (UP)
45	Exxon 1605 PP	Lens B	170	0	Epolene E43 (1%) + Rough Bowl
	Exxon 1605 PP	Lens C	200	0	Epolene E43 (1%) + Rough Bowl

What is claimed is

1. A package for storing medical devices in a solution comprising a molded base wherein the molded base comprises an additive, provided that  
5 the medical device is not a contact lens consisting of acqualfilcon A coated with polyHema.
2. The package of claim 1 wherein the additive is selected from the group consisting of succinic acid, glycerol monostearate, PVP, and PVP/maleic  
10 anhydride.
3. The package of claim 1 wherein the additive is glycerol monostearate.
4. The package of claim 3 wherein glycerol monostearate is present at a  
15 concentration of greater than about 0.5 weight percent to about 5 weight percent.
5. The package of claim 3 wherein glycerol monostearate is present at a concentration of about 2 percent.  
20
6. The package of claim 1 wherein the additive is PVP KD90.
7. The package of claim 6 wherein the PVP concentration is about 1% to about 5%.  
25
8. The package of claim 6 wherein the PVP concentration is about 1.0%.
9. The package of claim 1 wherein the additive is PVP KD90/maleic anhydride.  
30
10. The package of claim 9 wherein the PVP KD90/maleic anhydride concentration is about 1/1% to about 5/5%.

11. The package of claim 1 wherein the medical device is a contact lens which comprises balafilcon A, lotrafilcon A, galyfilcon, senofilcon, or lenses disclosed in U.S. Pat. App. No. 60/318,536, entitled Biomedical Devices Containing Internal wetting Agents," filed on September 10, 2001 and its non-provisional counterpart of the same title, filed on September 6, 2002.

12. The package of claim 11 wherein the contact lens comprises Simma 2 and mPDMS.

13. The package of claim 11 wherein the contact lens comprises Simma 2

14. The package of claim 1 wherein the molded base comprises polypropylene.

15. The package of claim 1 further comprising a cavity formed in said molded base wherein said cavity comprises an inner surface, wherein said inner surface has an average roughness of about 0.5  $\mu\text{m}$  to about 20  $\mu\text{m}$ .

16. The package of claim 15 wherein the inner surface has an average roughness of about 1.8  $\mu\text{m}$  to about 4.5  $\mu\text{m}$ .

17. The package of claim 15 wherein the inner surface has an average roughness of about 1.9  $\mu\text{m}$  to about 2.1  $\mu\text{m}$

18. The package of claim 15 wherein the inner surface has an average roughness of about 0.5  $\mu\text{m}$  to about 0.8  $\mu\text{m}$ .

19. The package of claim 1 further comprising a cavity formed in said molded base wherein said cavity comprises an inner surface, wherein said inner surface has an average roughness of about 0.5  $\mu\text{m}$  to about 20  $\mu\text{m}$  and the additive is glycerol monostearate or PVP.

20. The package of claim 19 wherein the average roughness of the inner surface is about 0.5  $\mu\text{m}$  to about 0.8  $\mu\text{m}$  and the concentration of PVP is about 1%.
- 5 21. The package of claim 19 wherein the inner surface has an average roughness of about 1.9  $\mu\text{m}$  to about 2.1  $\mu\text{m}$  and the concentration of PVP is about 1%.
- 10 22. The package of claim 1 further comprising a cavity formed in said molded base wherein said cavity comprises an inner surface, wherein said inner surface has an average roughness of about 0.5  $\mu\text{m}$  to about 20  $\mu\text{m}$  and the additive is maleic anhydride or PVP/maleic anhydride.
- 15 23. The package of claim 22 wherein the average roughness of the inner surface is about 0.5  $\mu\text{m}$  to about 0.8  $\mu\text{m}$  and the concentration of PVP/maleic anhydride is about 1%.
- 20 24. The package of claim 22 wherein the inner surface has an average roughness of about 1.9  $\mu\text{m}$  to about 2.1  $\mu\text{m}$  and the concentration of PVP/maleic anhydride is about 1%.
- 25 25. The package of claim 22 wherein the average roughness of the inner surface is about 0.5  $\mu\text{m}$  to about 0.8  $\mu\text{m}$  and the concentration of maleic anhydride is about 1%.
26. The package of claim 22 wherein the inner surface has an average roughness of about 1.9  $\mu\text{m}$  to about 2.1  $\mu\text{m}$  and the concentration of maleic anhydride is about 1%.
- 30 27. A method of reducing the adherence of a medical device to its packaging, comprising storing said medical device in a solution in a package comprising a molded base wherein said molded base comprises an additive,

provided that the medical device is not a contact lens consisting of acqualfilcon A coated with polyHema.

28. The method of claim 27 wherein additive is selected from the group  
5 consisting of succinic acid, glycerol monostearate, and PVP.

29. The method of claim 27 wherein the additive is glycerol monostearate.

30. The method of claim 27 wherein glycerol monostearate is present at a  
10 concentration of greater than about 0.25 weight percent to about 5 weight percent.

31. The method of claim 27 wherein glycerol monostearate is present at a  
concentration of about 2 percent.

15

32. The method of claim 27 wherein the additive is PVP KD90.

33. The method of claim 27 wherein the PVP is present at about 1% to  
about 5%.

20

34. The method of claim 27 wherein the contact lens comprises balafilcon A,  
lotrafilcon A, or lenses disclosed in U.S. Pat. App. No. 60/318,536, entitled  
Biomedical Devices Containing Internal wetting Agents," filed on September 10,  
2001 and its non-provisional counterpart of the same title, filed on September  
25 6, 2002.

35. The method of claim 27 wherein the contact lens comprises Simma 2

36. The method of claim 27 wherein the molded base comprises  
30 polypropylene.

37. The method of claim 27 further comprising a cavity formed in said  
molded base wherein said cavity comprises an inner surface, wherein said



inner surface has an average roughness of about 0.5  $\mu\text{m}$  to about 20  $\mu\text{m}$  and the additive is glycerol monostearate or PVP.

38. The method of claim 37 wherein the average roughness of the inner  
5 surface is about 0.5  $\mu\text{m}$  to about 0.8  $\mu\text{m}$  and the concentration of PVP is about 1%.

39. The method of claim 37 wherein the inner surface has an average  
roughness of about 1.9  $\mu\text{m}$  to about 2.1  $\mu\text{m}$  and the concentration of PVP is  
10 about 1%.

40. The method of claim 27 further comprising a cavity formed in said  
molded base wherein said cavity comprises an inner surface, wherein said  
inner surface has an average roughness of about 0.5  $\mu\text{m}$  to about 20  $\mu\text{m}$  and  
15 the additive is maleic anhydride or PVP/maleic anhydride.

41. The method of claim 40 wherein the average roughness of the inner  
surface is about 0.5  $\mu\text{m}$  to about 0.8  $\mu\text{m}$  and the concentration of PVP/maleic  
anhydride is about 1%.  
20

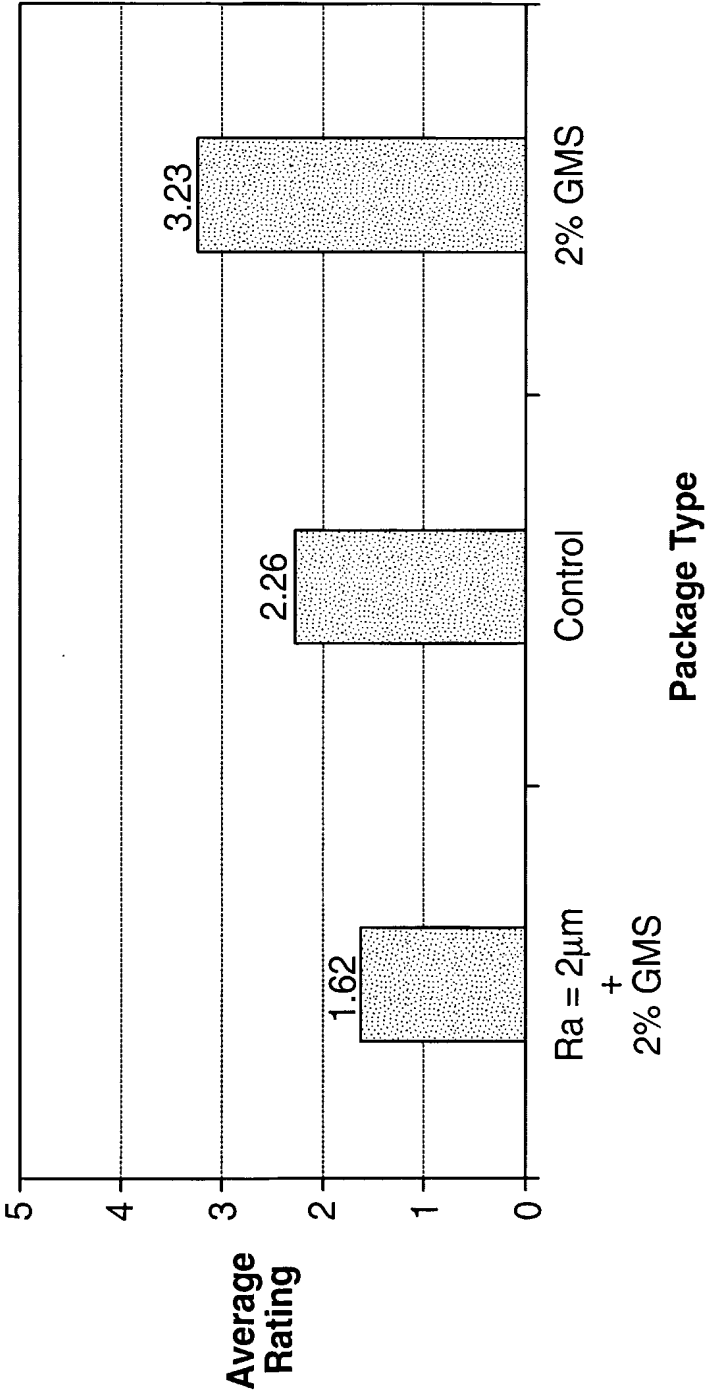
42. The method of claim 40 wherein the inner surface has an average  
roughness of about 1.9  $\mu\text{m}$  to about 2.1  $\mu\text{m}$  and the concentration of  
PVP/maleic anhydride is about 1%.

25 43. The method of claim 40 wherein the average roughness of the inner  
surface is about 0.5  $\mu\text{m}$  to about 0.8  $\mu\text{m}$  and the concentration of maleic  
anhydride is about 1%.

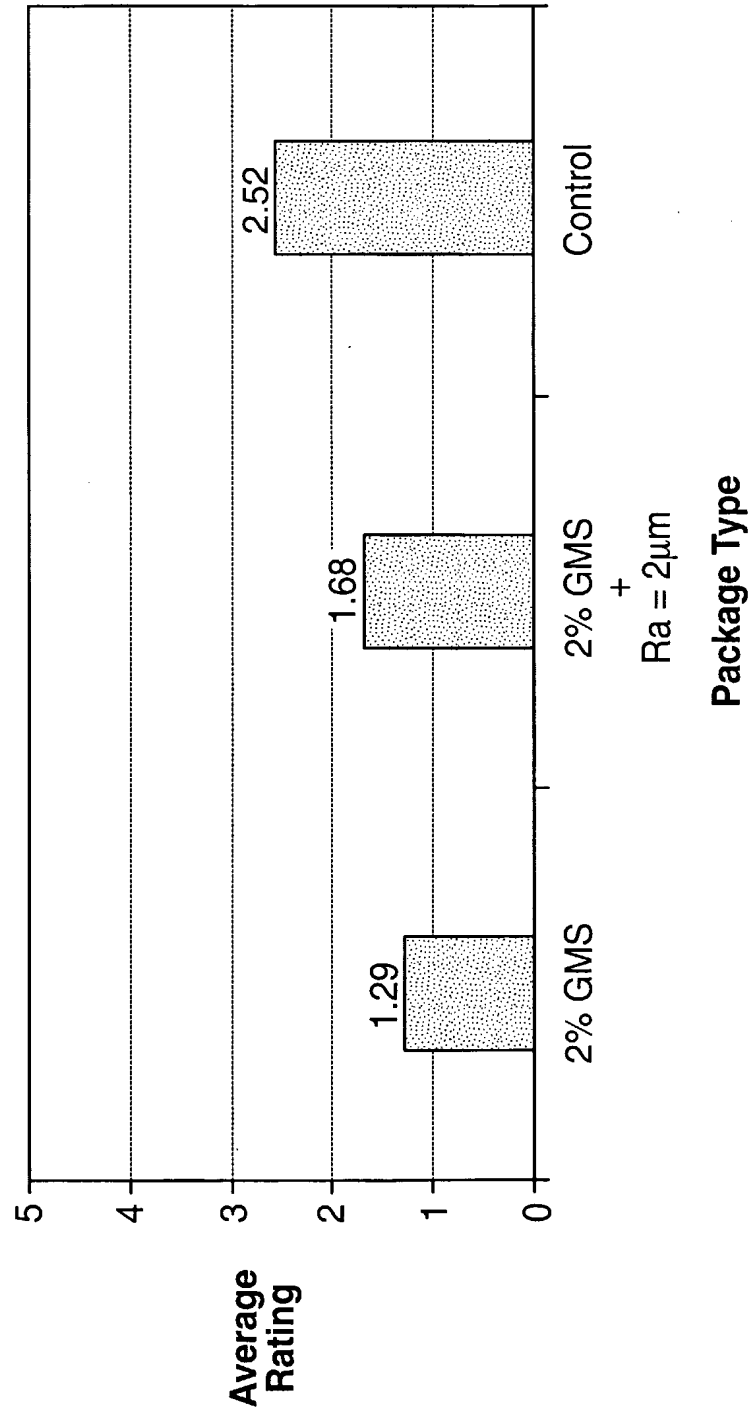
44. The method of claim 40 wherein the inner surface has an average  
30 roughness of about 1.9  $\mu\text{m}$  to about 2.1  $\mu\text{m}$  and the concentration of maleic  
anhydride is about 1%.

45. A method of hydrating a contact lens comprising, consisting essentially of, or consisting of hydrating said lens in a molded base wherein said molded base comprises an additive.
- 5 46. The method of claim 45 wherein the additive is selected from the group consisting of succinic acid, glycerol monostearate, PVP, and PVP/maleic anhydride.
- 10 47. The method of claim 46 wherein the additives are present at a concentration of greater than about 0.25 weight percent to about 5 weight percent.
- 15 48. The method of claim 45 wherein the molded base further comprises a cavity formed in said molded base wherein said cavity comprises an inner surface, wherein said inner surface has an average roughness of about 0.5  $\mu\text{m}$  to about 20  $\mu\text{m}$  and the additive is maleic anhydride or PVP/maleic anhydride.

**FIG. 1**  
Lens A  
Average Rating by Package Type

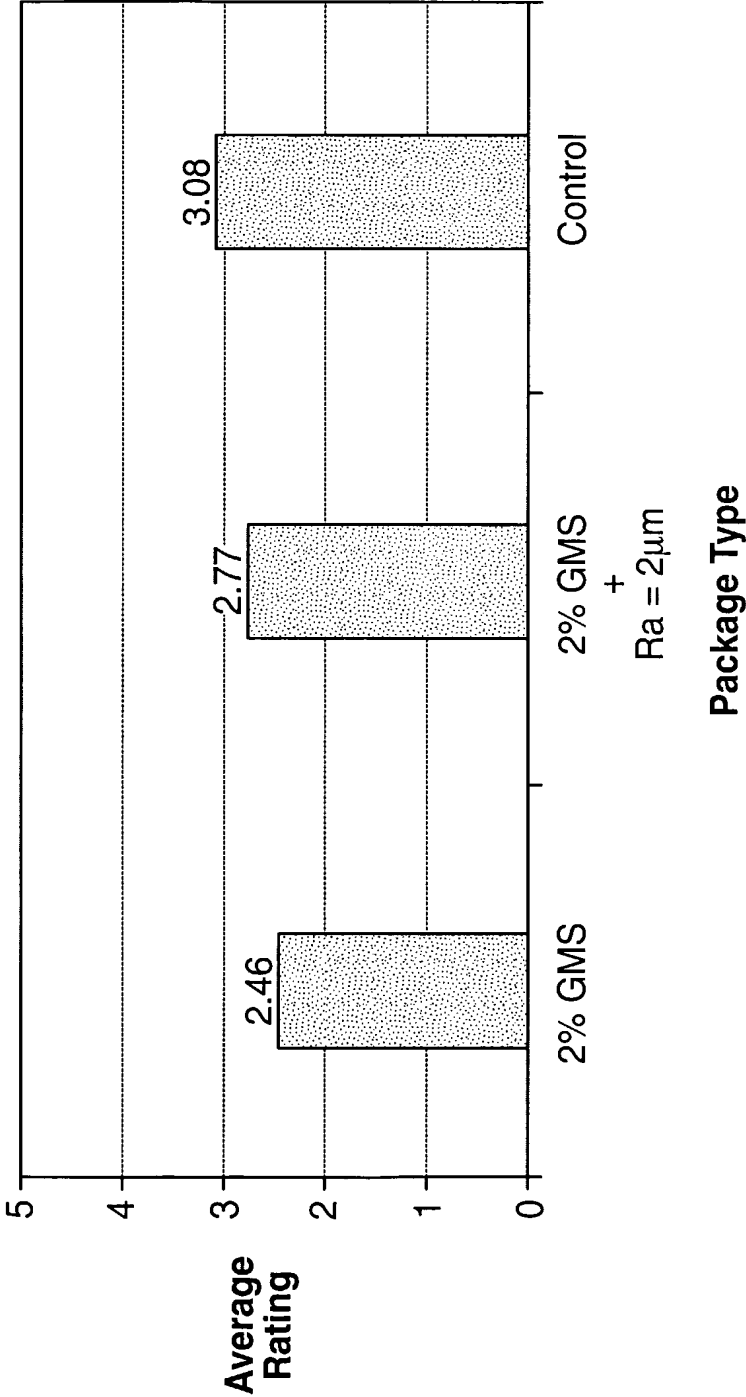


**FIG. 2**  
**Lens B**  
**Average Rating by Package Type**



**FIG. 3**

Lens C  
Average Rating by Package Type



(19) World Intellectual Property  
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International Bureau



(43) International Publication Date  
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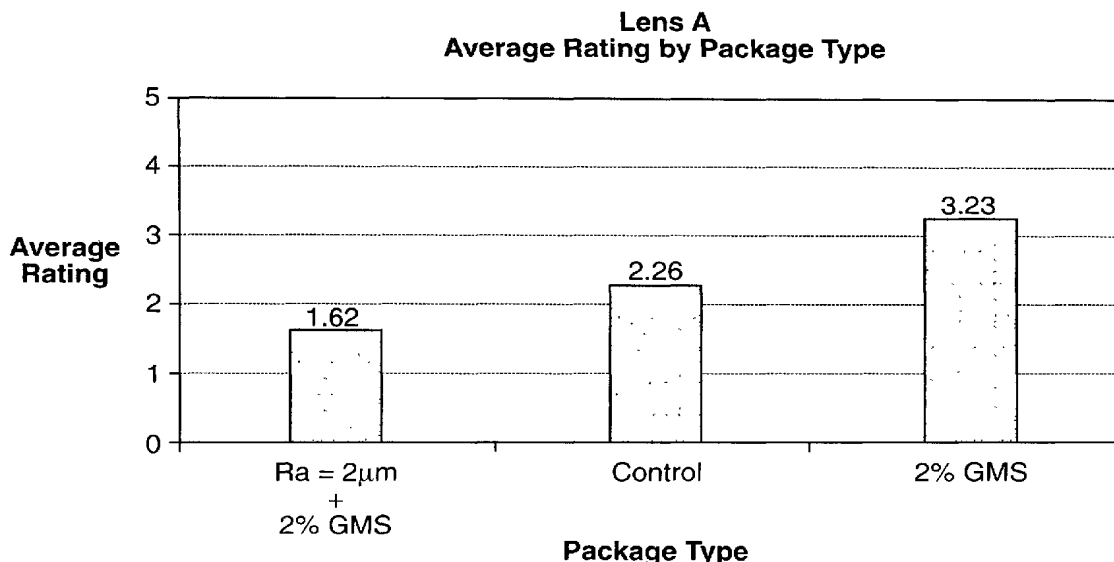
PCT

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European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
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[Continued on next page]

(54) Title: MEDICAL DEVICE PACKAGES CONTAINING ADDITIVES



(57) Abstract: A package comprising a moulded base having an additive that presents the adhesion of a medical device enclosed in the package.

WO 2004/060099 A3



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 03/39017

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61L12/08 A45C11/00 A45C11/04 B65B25/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/069896 A1 (PANKOW MARK L) 13 June 2002 (2002-06-13) paragraphs '0016!, '0072! -----	1,27
X	EP 0 367 513 A (BRITISH TECH GROUP) 9 May 1990 (1990-05-09) column 5, lines 17-21 column 6, lines 9-11 column 7, line 48 - column 8, line 11 -----	45
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

\* Special categories of cited documents:

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\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*G\* document member of the same patent family

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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 03/39017

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 033 326 A (JOHNSON & JOHNSON VISION CARE) 6 September 2000 (2000-09-06) paragraphs '0013!, '0018! - '0021!, '0041!; claims 1,16,17 -----	1,27
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A	DATABASE WPI Section Ch, Week 197737 Derwent Publications Ltd., London, GB; Class A96, AN 1977-65891Y XP002287714 & JP 52 093398 A (TOA IYO DENSHI KK) 5 August 1977 (1977-08-05) abstract -----	1,2,6-8, 14
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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 03/39017

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1, 2 (part), 27, 28 (part)

A package for storing medical devices in a solution comprising a molded base wherein the molded base comprises a succinic acid additive.

A method of reducing the adherence of a medical device to its packaging, comprising storing said medical device in a solution in a package comprising a molded base and a succinic acid additive.

---

2. claims: 1, 2 (part), 27, 28 (part)

A package for storing medical devices in a solution comprising a molded base wherein the molded base comprises a glycerol monostearate additive.

A method of reducing the adherence of a medical device to its packaging, comprising storing said medical device in a solution in a package comprising a molded base and a glycerol monostearate additive.

---

3. claims: 1, 2 (part), 27, 28 (part)

A package for storing medical devices in a solution comprising a molded base wherein the molded base comprises a PVP additive.

A method of reducing the adherence of a medical device to its packaging, comprising storing said medical device in a solution in a package comprising a molded base and a PVP additive.

---

4. claims: 1, 2 (part), 27, 28 (part)

A package for storing medical devices in a solution comprising a molded base wherein the molded base comprises a PVP/maleic anhydride additive.

A method of reducing the adherence of a medical device to its packaging, comprising storing said medical device in a solution in a package comprising a molded base and a PVP/maleic anhydride additive.

---

5. claims: 45, 46 (part)

A method of hydrating a contact lens comprising, consistin essentially of, or consisting of hydrating said lens in a molded base wherein said molded base comprises a succinic acid additive.

---

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

6. claims: 45, 46 (part)

A method of hydrating a contact lens comprising, consistin essentially of, or consisting of hydrating said lens in a molded base wherein said molded base comprises a glycerol monostearate additive.

---

7. claims: 45, 46 (part)

A method of hydrating a contact lens comprising, consistin essentially of, or consisting of hydrating said lens in a molded base wherein said molded base comprises a PVP additive.

---

8. claims: 45, 46 (part)

A method of hydrating a contact lens comprising, consistin essentially of, or consisting of hydrating said lens in a molded base wherein said molded base comprises a PVP/maleic anhydride additive.

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Information on patent family members

In International Application No

PCT/US 03/39017

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